US009336815B1

(12) **United States Patent**
Trachy et al.

(10) **Patent No.: US 9,336,815 B1**
(45) **Date of Patent: May 10, 2016**

(54) **DYNAMIC WRITE ONCE READ MANY TAPE CARTRIDGE DESIGNATION**

(71) Applicant: **Spectra Logic Corporation**, Boulder, CO (US)

(72) Inventors: **David Lee Trachy**, Longmont, CO (US); **Walter Wong**, Boulder, CO (US)

(73) Assignee: **Spectra Logic, Corporation**, Boulder, CO (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **14/680,929**

(22) Filed: **Apr. 7, 2015**

(51) **Int. Cl.**

G11B 15/05	(2006.01)
G11B 15/07	(2006.01)
G11B 15/087	(2006.01)
G11B 15/68	(2006.01)

(52) **U.S. Cl.**
CPC ***G11B 15/05*** (2013.01); ***G11B 15/07*** (2013.01); ***G11B 15/087*** (2013.01); ***G11B 15/689*** (2013.01); ***G11B 15/6895*** (2013.01)

(58) **Field of Classification Search**
None
See application file for complete search history.

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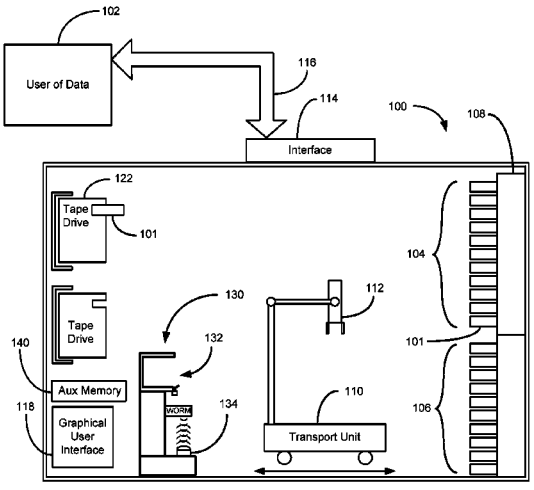
Primary Examiner — Wayne Young
Assistant Examiner — James L Habermehl
(74) *Attorney, Agent, or Firm* — Kenneth Altshuler

(57) **ABSTRACT**

A data storage library is described that essentially provides a write once and read many (WORM) conversion station located inside of the data storage library. After receiving a request to store data in a WORM arrangement on a tape cartridge in the data storage library and appropriate tape cartridge is selected from a scratch pool of tape cartridges, brought by a robotic transporter to a WORM station where the tape cartridge is converted into a WORM tape cartridge. The WORM tape cartridge can be converted back to a non-write disabled tape cartridge at the WORM station.

20 Claims, 9 Drawing Sheets



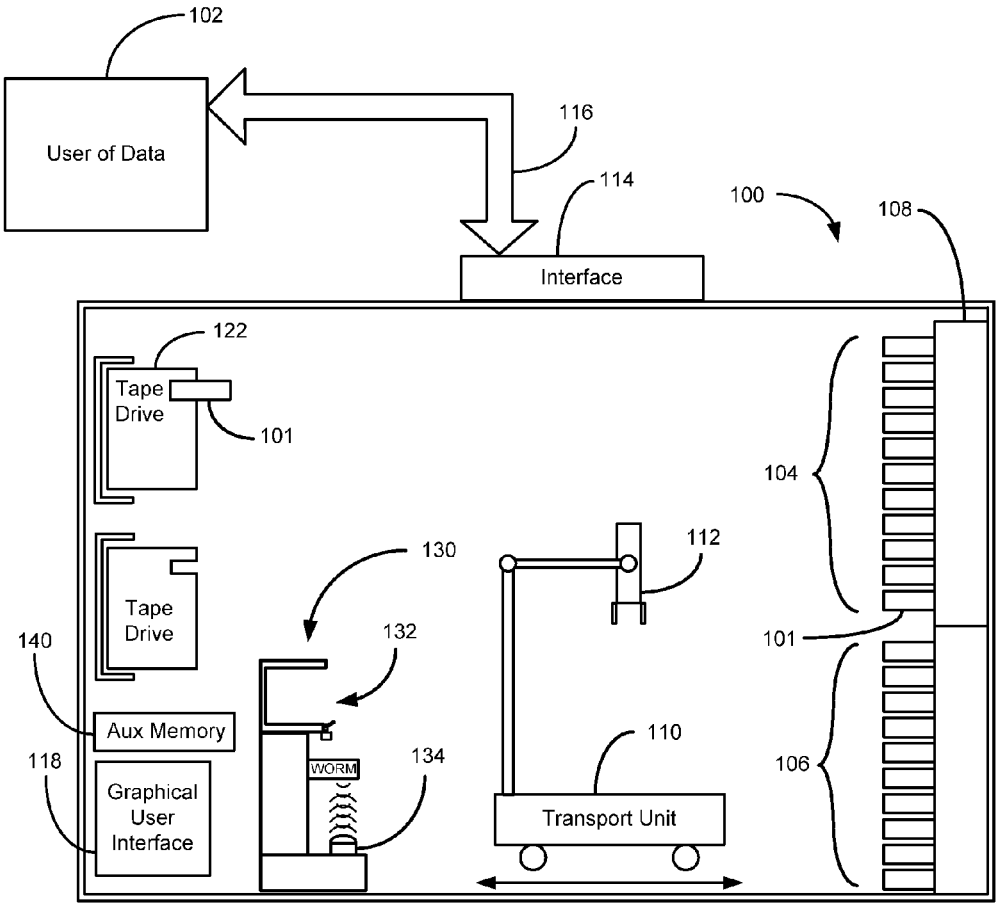

102
User of Data
116
114
100
108
Interface
122
Tape Drive
101
104
Tape Drive
130
112
140
132
101
Aux Memory
110
118
WORM
134
106
Graphical User Interface
Transport Unit

FIG. 1

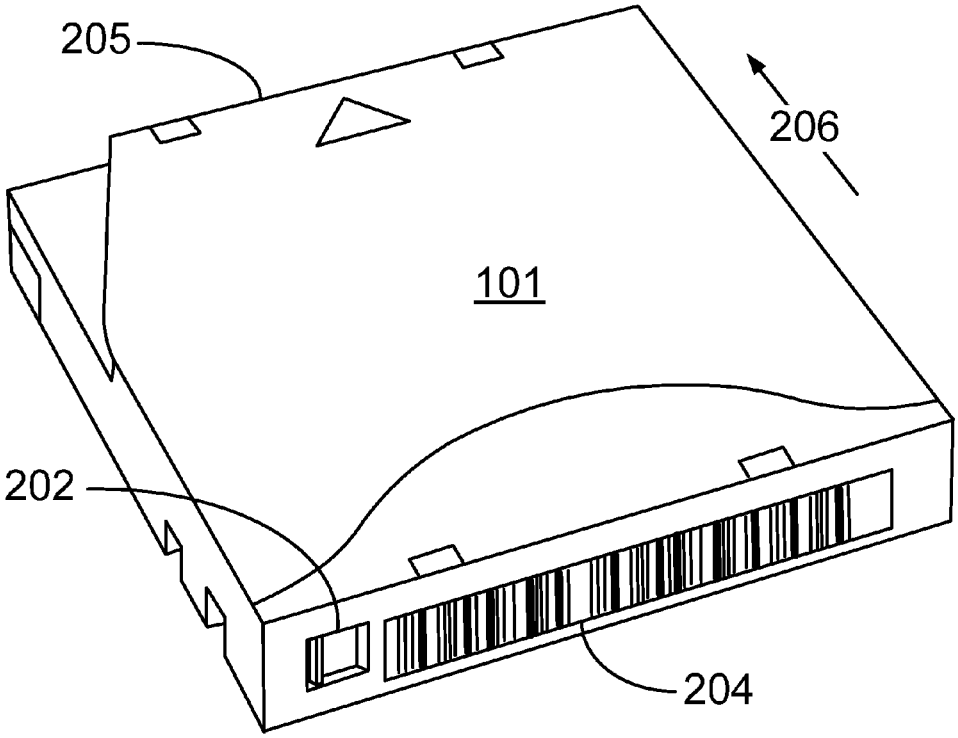


FIG. 2A

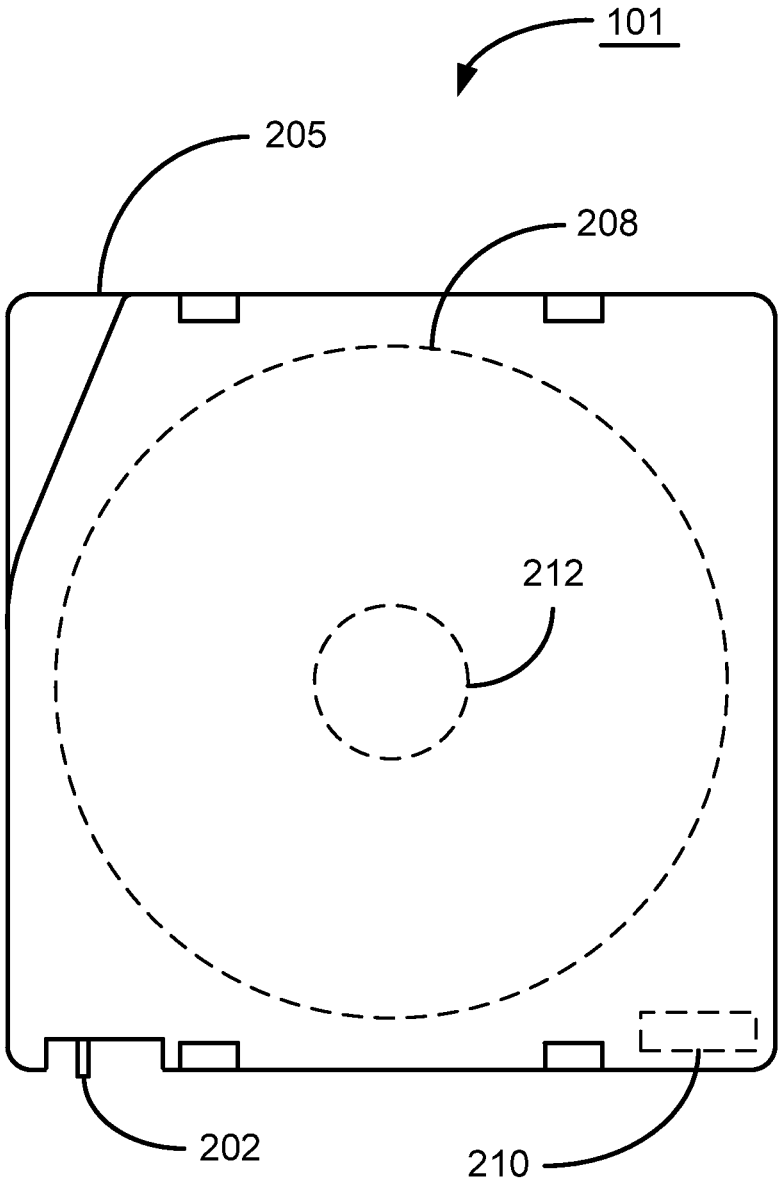
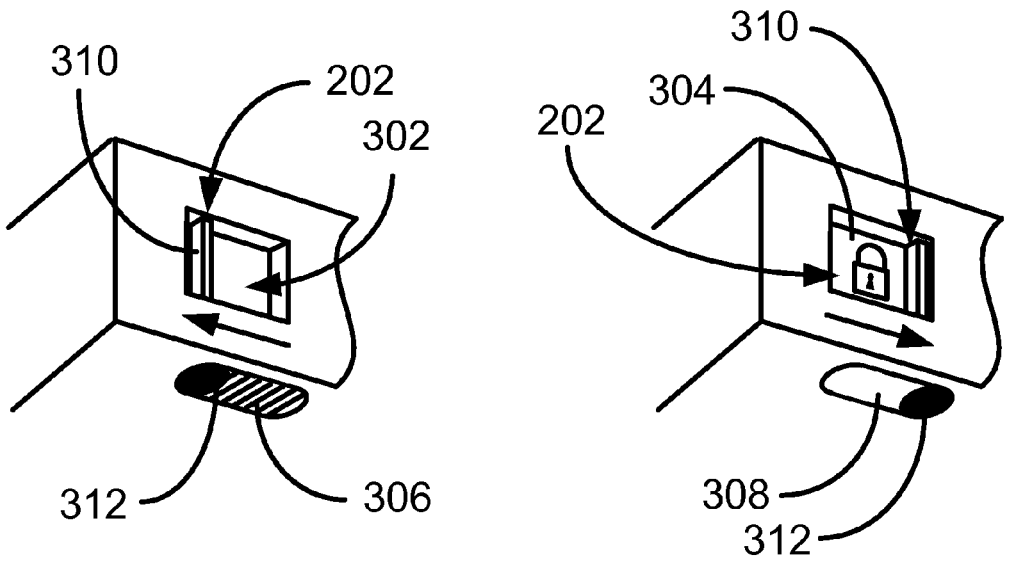


FIG. 2B



Write Protect Off Write Protect On

FIG. 3

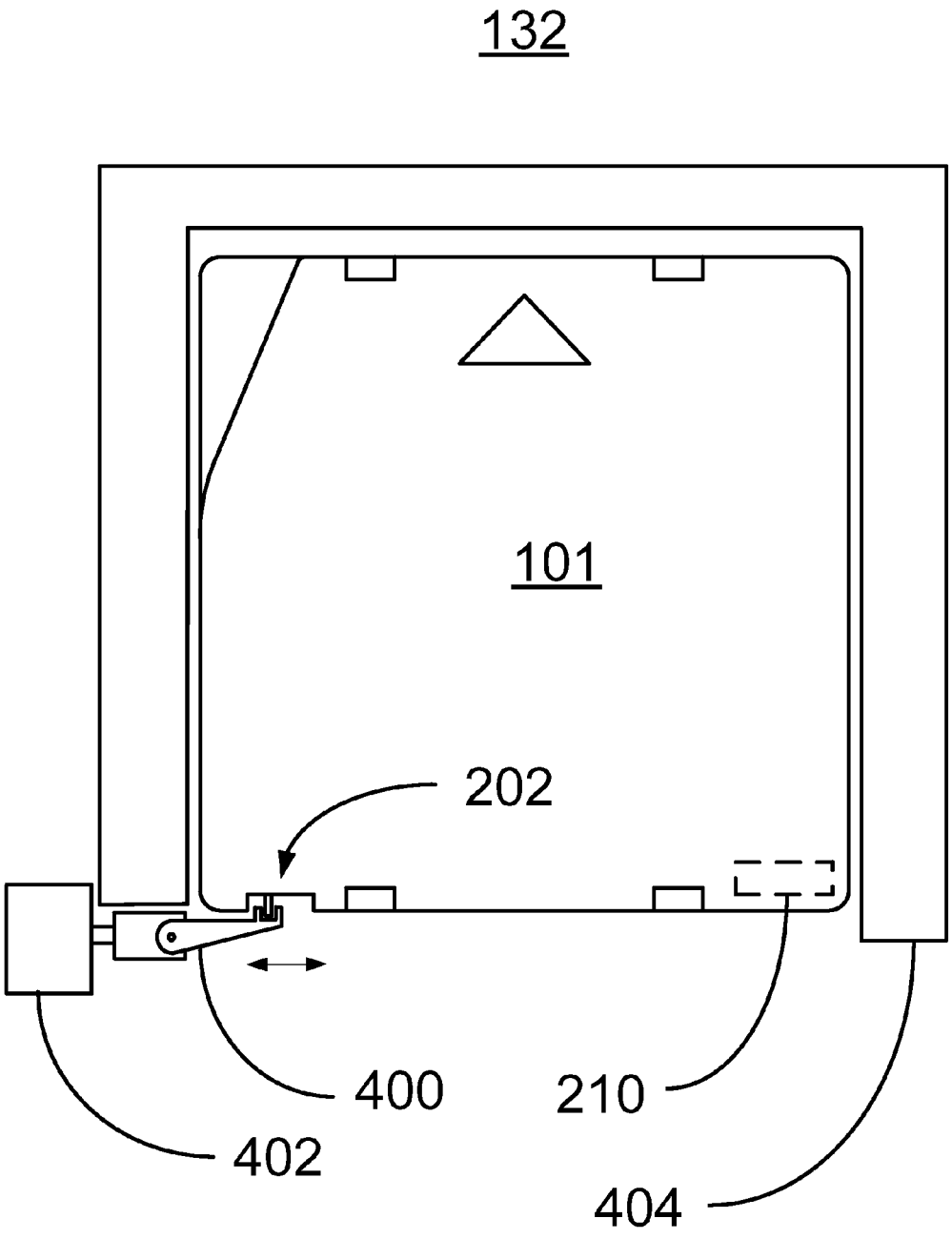


FIG. 4

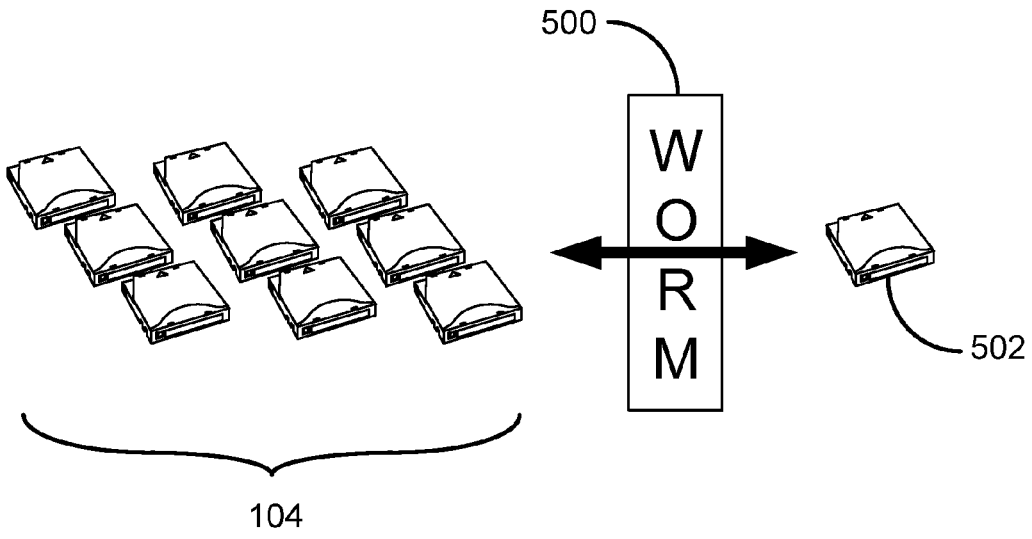


FIG. 5

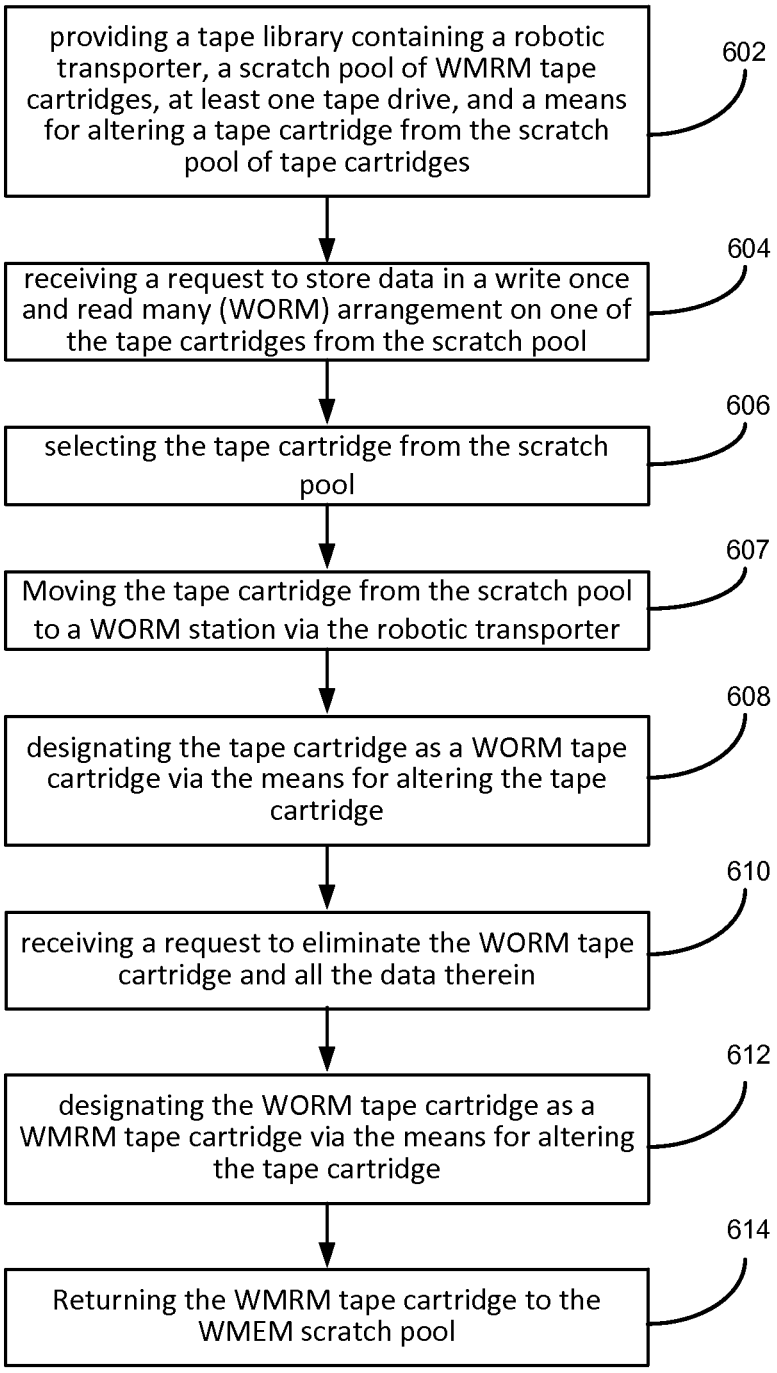

providing a tape library containing a robotic transporter, a scratch pool of WMRM tape cartridges, at least one tape drive, and a means for altering a tape cartridge from the scratch pool of tape cartridges
602
receiving a request to store data in a write once and read many (WORM) arrangement on one of the tape cartridges from the scratch pool
604
selecting the tape cartridge from the scratch pool
606
Moving the tape cartridge from the scratch pool to a WORM station via the robotic transporter
607
designating the tape cartridge as a WORM tape cartridge via the means for altering the tape cartridge
608
receiving a request to eliminate the WORM tape cartridge and all the data therein
610
designating the WORM tape cartridge as a WMRM tape cartridge via the means for altering the tape cartridge
612
Returning the WMRM tape cartridge to the WMEM scratch pool
614

FIG. 6

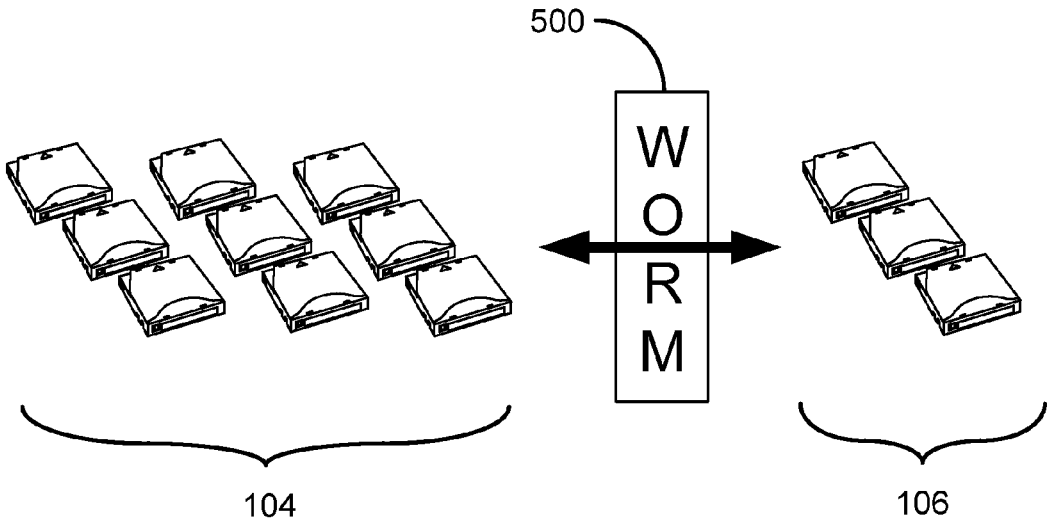


FIG. 7

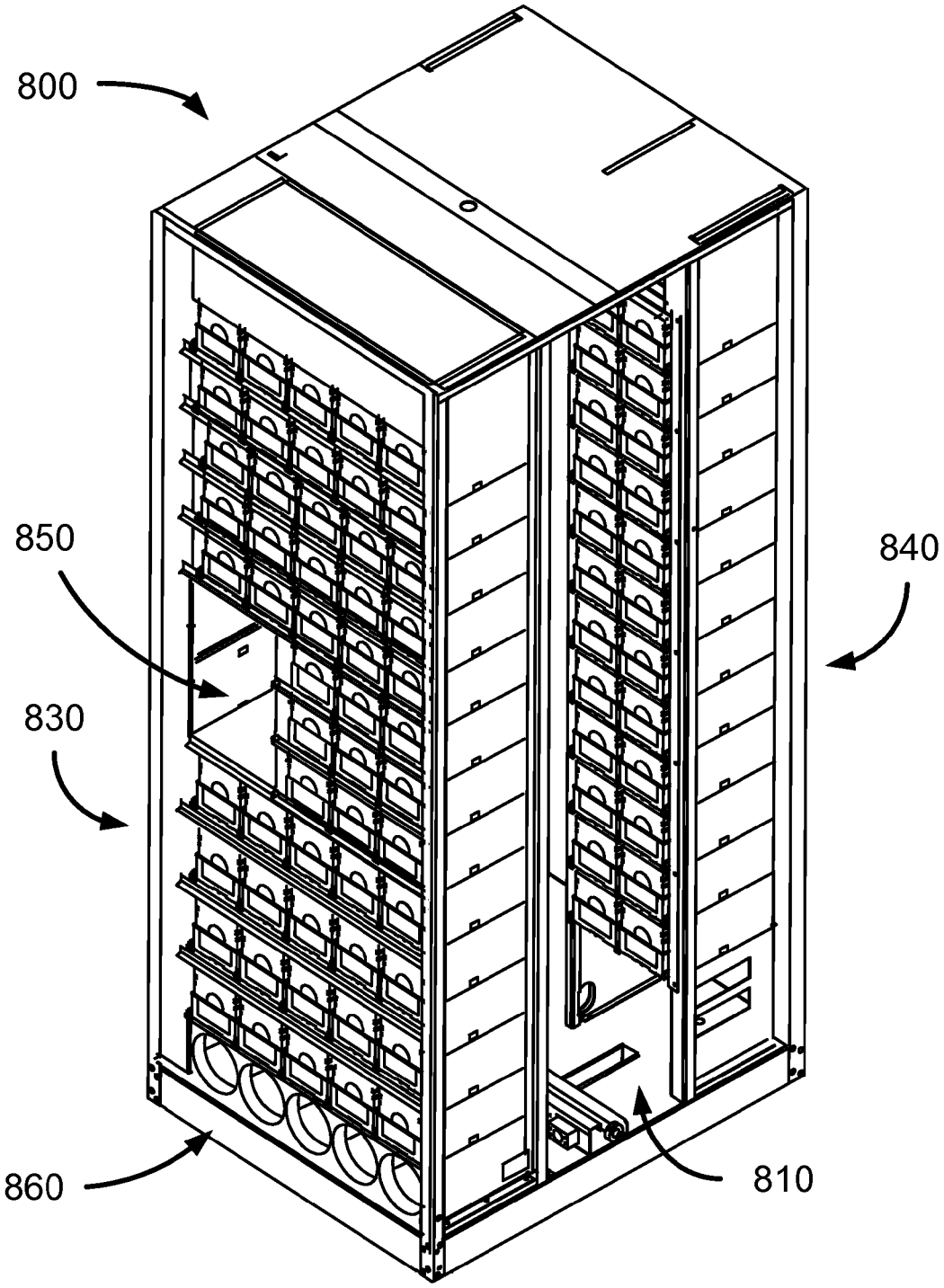


FIG. 8

DYNAMIC WRITE ONCE READ MANY TAPE CARTRIDGE DESIGNATION

CROSS-REFERENCE TO RELATED APPLICATIONS

None.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to tape libraries write protecting tape cartridges in tape libraries.

2. Description of Related Art

Data storage libraries, such as tape libraries, are typically used to store and retrieve large amounts of data for data manipulation and archiving purposes. These libraries are generally comprised of drive devices adapted to read and write data to and from tape cartridges that are often housed within the tape libraries. In the interest of protecting stored data from being overwritten, write once and read many (WORM) schemes can be employed on storage media. For example, CDs and DVDs can only be written once. Tape cartridges can be rewritten over and over, but can be write protected by manually toggling a write protect switch turning that tape cartridge into a WORM tape cartridge. The write protect switch on the tape cartridge is designed to be toggled by a human fingernail, obviously outside of any tape library or tape system. In fact, any tape cartridge designated as a WORM tape cartridge is done so when the tape is new and before loading the WORM tape cartridge in a tape library.

It is to improvements directed to WORM designation of tape cartridges that both methods and apparatus are disclosed herein. It is to innovations related to this subject matter that the claimed invention is generally directed.

SUMMARY OF THE INVENTION

The present invention relates generally to dynamic write protect of tape cartridges within tape libraries overcoming the disadvantages and limitations of the prior art by dynamically changing write protect on a tape cartridge using WORM designation station/s within a robotic tape library so as to create a WORM tape cartridge within tape library without the intervention of human hands or the designation of a WORM tape cartridge through software mapping.

One embodiment of the present invention can therefore comprise a method of providing a tape library containing a scratch pool of tape cartridges, at least one tape drive, and a means for altering a tape cartridge, from the scratch pool of tape cartridges, between a write many and read many (WMRM) arrangement and a write once and read many (WORM) arrangement; receiving a request to store data in the WORM arrangement on one of the tape cartridges from the scratch pool; selecting the tape cartridge from the scratch pool; and designating the tape cartridge as a WORM tape cartridge via the means for altering the tape cartridge, the receiving step, the selecting step, and the designating step done entirely within the tape library.

Other embodiments of the present invention may additionally providing a tape library with a scratch pool of tape cartridges, at least one tape drive, a MAM reader and writer independent of the tape drive; receiving a request to store data in a write once and read many (WORM) arrangement on one of the tape cartridges from the scratch pool; selecting a tape cartridge from the scratch pool; designating the tape cartridge as a WORM tape cartridge by storing WORM only instructions on a MAM device located in the tape cartridge via the MAM reader and writer.

Yet further embodiments of the present invention may comprise a method comprising the steps of: providing a tape library containing a scratch pool of tape cartridges, at least one tape drive, and a means for altering a tape cartridge between a write many and read many arrangement and a write once and read many (WORM) arrangement, the scratch pool of tape cartridges; receiving a request to store data in the WORM arrangement on one of the tape cartridges from the scratch pool; selecting the tape cartridge from the scratch pool based on a predefined previous use parameter of the tape cartridge; and designating the tape cartridge as a WORM tape cartridge via the means for altering the tape cartridge, the receiving step, the selecting step, and the designating step done entirely within the tape library.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an illustration of a data storage arrangement constructed in accordance with an embodiment of the present invention.

FIG. **2**A depicts a perspective illustration of an embodiment of a tape cartridge consistent with embodiments of the present invention.

FIG. **2**B illustratively depicts the tape cartridge consistent with embodiments of the present invention.

FIG. **3** illustratively depicts an embodiment of the write protect switch consistent with embodiments of the present invention.

FIG. **4** illustratively depicts the Write protect switch toggling station consistent with embodiments of the present invention.

FIG. **5** depicts a simplified illustration of scratch pool tape cartridges comprising WMRM pool of tape cartridges and a WORM tape cartridge consistent with embodiments of the present invention.

FIG. **6** depicts a method embodiment consistent with embodiments of the present invention.

FIG. **7** depicts a simplified illustration of scratch pool tape cartridges comprising WMRM pool of tape cartridges and a WORM pool of tape cartridges consistent with embodiments of the present invention.

FIG. **8** shows a commercial embodiment of one T-950 library unit wherein aspects of the present invention can be practiced.

DETAILED DESCRIPTION

Initially, this disclosure is by way of example only, not by limitation. Thus, although the instrumentalities described herein are for the convenience of explanation, shown and described with respect to exemplary embodiments, which generally include, but are not limited to, dynamically switching a tape cartridge between being write protecting and being able to be overwritten inside of a tape library without intervention of human hands. It will be appreciated that the principles herein may be applied equally in other types of situations involving similar uses of WORM to protect against data overwrite consistent with the scope and spirit of the present invention.

Referring to the drawings in general, and more specifically to FIG. **1**, shown therein is an illustration of a data storage arrangement constructed in accordance with an embodiment of the present invention. In what follows, similar or identical structures may be identified using identical callouts. FIG. **1**

depicts certain basic elements in a data storage library for descriptive purposes. In reality, a data storage library possesses CPUs, keyboard, power lines, fans, CAN (computer area network), buses, switches, and many other electrical and mechanical devices known to those skilled in the art.

The data storage arrangement illustrated in FIG. **1** can comprise a user of data **102**, such as a client, in communication with a data storage library **100**. As illustratively shown, the client **102** is in communication with the library **100** via a communication path **116** and a library interface device **114**. The library **100** comprises a plurality of tape cartridges **101** disposed in a shelf system **108**, which in some embodiments contemplate the tape magazine (not shown) which resembles a shoebox containing a plurality of tape cartridges **101**. The shelf system holds tape cartridges **101** inside of the data storage library **100**. Certain embodiments contemplate each of the tape cartridges **101** containing an auxiliary radio frequency memory device (not shown) capable of storing auxiliary digital data. Other embodiments contemplate each tape cartridge **101** providing a Write protect switch **202** that when toggled changes the tape cartridge **101** from a WMRM tape cartridge to a WORM tape cartridge, shown in FIG. **2**.

With continued reference to FIG. **1**, depicted are 2 tape drives **122**, each capable of reading and writing data to and from one of the plurality of tape cartridges **101**. The tape cartridges **101** are moved between the shelf system **108** and the tape drives **122** (or to the WORM station **130**) via a robotic transport unit **110**. The robotic transport unit **110** further possesses a picker device **112** that is adapted to grasp and release a tape cartridge **101**, such as to remove a tape cartridge **101** from the shelf system **108** and insert the tape cartridge **101** in the tape drive **122**, for example. Certain embodiments contemplate multiple robotic units **110** and multiple picker devices **112** in a data storage library **100**. As further depicted, the data storage library **100** possesses auxiliary memory **140** that can store and maintain data within the data storage library **100** such as the location of each tape cartridge **101**, routines the control devices within the data storage library **100**, etc. The auxiliary memory **140** can be a hard disk drive, solid state memory device, and the like within the scope and spirit of the present invention. Also depicted is a graphical user interface **118**, which an operator can use the input commands or data into the data storage library **100**.

In the present configuration, the data storage library **100** is depicted with 2 groups of tape cartridges **101**, a scratch pool of WMRM tape cartridges **104** and a pool of WORM tape cartridges **106**. The present embodiment of the data storage library **100** further depicts a WORM station **130** that comprises both a Write protect switch toggling station **132** and an RFID reader and writer **134**. More specifically, the Write protect switch toggling station **132** is contemplated to provide a mechanical mechanism that physically toggles the Write protect switch **202** of the tape cartridge **101**. Embodiments also contemplate the RFID reader and writer **134** designating a tape cartridge **101** to be a WORM tape cartridge **106** by transmitting WORM only instructions to be stored to a MAM (RFID medium auxiliary memory) device (not shown) in the tape cartridges **101**. Certain embodiments contemplate the data storage library **100** equipped with just an RFID reader and writer **134** or just a Write protect switch toggling station **132**. Other embodiments contemplate multiple RFID readers and writers **134** and/or multiple Write protect switch toggling stations **132**. Embodiments contemplate the RFID reader and writer **134** and Write protect switch toggling station **132** being confined within the data storage library **100** as a system used in the data storage library **100** serviced by the robotic transport unit **110** and the picker device **112**.

FIG. **2**A depicts a perspective illustration of an embodiment of a tape cartridge **101** consistent with embodiments of the present invention. As shown, the tape cartridge **101** possesses a Write protect switch **202** that when toggled alters the tape cartridge **101** to be either a WMRM tape cartridge or a WORM tape cartridge. A bar code **204** is disposed on the outer facing face of the tape cartridge **101**, for reference. The tape cartridge **101** possesses an outer housing **205** that contains the tape medium **208** (shown in FIG. **2**B) and the MAM **210** (also shown in FIG. **2**B), as well as other components known to those skilled in the art such as, a leader pin, spindle, etc. The arrow **206** indicates the direction to which the tape cartridge **101** is inserted into a tape drive **122**.

FIG. **2**B illustratively depicts the tape cartridge **101** consistent with embodiments of the present invention. As shown by the dashed lines, contained within the tape cartridge housing **205** are the tape medium **208**, the spindle **212**, and the MAM **210**. The tape medium **208** is typically, though not necessarily, a magnetic tape medium which is wrapped around the spindle **212**. The MAM **210** is in RFID (radio frequency identification) device that possesses and antenna (not shown), which is activated inductively in the presence of a radio frequency, such as from the MAM reading/writing device **134**. In one embodiment, the MAM **210** possesses non-volatile memory which can be parceled into different regions in which data can be stored. For example, a MAM **210** can be parceled into a medium device region which contains information such as serial number, a device region which contains information from the tape drive such as load count, a host/vendor unique region. One embodiment contemplates the host/vendor unique region being capable of containing information such as if the tape cartridge **101** is designated as a WORM tape cartridge or a WMRM tape cartridge. Other embodiments contemplate no constraint to any specific location or parcel in the MAM **210** containing the information of whether or not a tape cartridge **101** is designated as a WORM tape cartridge or a WMRM tape cartridge. One embodiment contemplates a MAM reading/writing device **134** inductively activating the MAM **210** and transmitting instructions to the MAM **210** designating the tape cartridge **101** as either a WORM tape cartridge or a WMRM tape cartridge. The instructions can be a complex string of bits or optionally a single state bit that is toggled between 1 and 0. The data storage library **100** is envisioned to possess the appropriate capacity to identify the tape cartridge **101** as a WORM tape cartridge or a WMRM tape cartridge via a MAM reading device. An MAM reading device, in certain embodiments, is integrated in a tape drive **122**. Other embodiments envision an MAM reading device in various locations around the data storage library **100**.

FIG. **3** illustratively depicts an embodiment of the write protect switch **202** shown in more detail from FIG. **2**A. In the depicted embodiment, the write protect switch **202** is a singular unit generally possessing a door **304**, a lip **310** that protrudes from the door **304**, and a knob **312**, that is essentially flush with the tape cartridge housing **205**. As shown, when the write protect switch **202** is in the closed state (image to the left), the tape cartridge **101** is physically identified by the tape drive **122** as a WMRM tape cartridge. In this state where the write protect is disabled, there is a write many opening **302**. However, when the write protect is disabled, the knob **312** on the bottom of the tape cartridge **101** is in a closed position covering the write protect opening **308** with a plastic shield, or door, **306** (as depicted via the hash marks). When the write protect switch **202** is in the open state (image to the right), the tape cartridge **101** is physically identified by the tape drive **122** as a WORM tape cartridge. In this state where

the write protect is enabled, the write many opening **302** is covered by a plastic (or other suitable material) shield, or door, **304** shown with a lock on the plastic shield **304**. However, when the write protect is enabled, the knob **312** on the bottom of the tape cartridge **101** is in an open position whereby the write protect opening **302** is exposed allowing a pin (not shown) associated with the tape drive **122** to penetrate through the write protect opening **302** allowing the tape drive **122** to identify the tape cartridge **101** as a WORM tape cartridge.

FIG. **4** illustratively depicts the Write protect switch toggling station **132** of FIG. **1** consistent with embodiments of the present invention. The Write protect switch toggling station **132** can generally provide a housing **404** that can accommodate a tape cartridge **101** when the arm **400** is pivoted in an unobstructed of location to allow the tape cartridge **101** to be slid into the Write protect switch toggling station **132**. The arm **400** can be equipped with a mating feature capable of moving the write protect switch **202** to an opening closed position depicted by the two-way arrow. The Write protect switch toggling station **132** can further possess an actuator **402** to move the arm **400** in the direction of the two-way arrow. Other embodiments contemplate a mechanism to toggle the knob **312** similarly. FIG. **4** is an overly simplified illustration of the Write protect switch toggling station **132**, which does not include locking mechanisms to hold the tape cartridge **101** in place, electrical wires, power cords, sensors, and other electromechanical parts that would be known to those skilled in the art.

FIG. **5** depicts a simplified illustration of scratch pool tape cartridges **101** that comprise WMRM pool **104** and WORM tape cartridge **502** consistent with embodiments of the present invention. The tape cartridges **101** from the WMRM pool **104** passes through the WORM function block **500** to become a WORM tape cartridge **502**. The WORM function block **500** essentially cooperates with tape cartridges **101** to convert between WORM tape cartridges and WMRM tape cartridges consistent with the functional spirit of the WORM station **130**.

FIG. **6** depicts a method embodiment consistent with embodiments of the present invention. In one embodiment, FIG. **6** can be described in conjunction with FIG. **5**. Fundamentally, a data storage library **100** consistent with FIG. **1** is provided containing a scratch pool of WMRM tape cartridges **104**, at least one tape drive **122**, and a means for altering **500** a tape cartridge **101** between a WMRM tape cartridge and a WORM tape cartridge, block **602**. In the present embodiment, though the WMRM tape cartridges **104**, the at least one tape drive **122** generally and typically reside within the tape library **101**, the means for altering **500** a tape cartridge **101** between a WMRM tape cartridge and a WORM tape cartridge is necessarily confined to and resides within the data storage library **100**. In this embodiment, the data storage library **100** and the method of FIG. **6** would be in operable if the means for altering **500** a tape cartridge **101** between a WMRM tape cartridge and a WORM tape cartridge was not confined within the data storage library **100**. The means for altering a tape cartridge **101** between WMRM and WORM states is shown in WORM function block **500**. This can include a Write protect switch toggling station **132**, which mechanically moves the Write protect switch **202** on the tape cartridge **101**, and/or an RFID reader and writer **134** that designates a tape cartridge **101** to be either a WMRM tape cartridge **104** or a WORM tape cartridge **502** by transmitting the appropriate instructions to be stored to a MAM device in the tape cartridges **101**.

With continued reference to FIG. **6**, block **604** shows receiving a request to store data in a WORM arrangement on one of the tape cartridges **101** from the WMRM scratch pool **104**. Certain embodiments contemplate the request received from a client **102**, but other embodiments contemplate the request inputted by an operator, for example.

Method step **606** refers to selecting the tape cartridge **101** to be converted in a WORM configuration from the WMRM scratch pool **104**. Selecting the tape cartridge **101** can be relegated to a predefined parameter associated with each of the tape cartridges **101**. For example, because tape cartridges **208** converted to a WORM configuration will possibly never be over-written once data has been written to the tape medium **208**, it may be advantageous to choose a tape cartridge **101** based on a predefined parameter such as a previously used tape cartridge. The predefined parameter is envisioned to include the most used tape cartridge having the most run time on it (e.g., the most reads and/or writes), a tape cartridge that has been previously written to the most, a tape cartridge that has been previously read the most, a tape cartridge that has been loaded the most times into a tape drive **122**, a tape cartridge that has been simply used previously from a pool of tape cartridges that have never been used, a tape cartridge that has been previously used multiple times (that is more than once), the oldest tape cartridge in the WMRM pool **104** even if the oldest tape cartridge has never been used (oldest being defined as the earliest manufacturing date of the tape cartridge relative to all the other tape cartridges), one of the oldest tape cartridges in the WMRM pool **104**, and the like.

Method step **607** is directed to moving the selected tape cartridge from the WMRM pool **104** to the means for altering **500** via a robotic transporter **110**, all within the data storage library **100**. The robotic transporter **110** possesses a picker device **112** that grasps tape cartridges **101** and is capable of moving the grasped tape cartridge **101** to and from the appropriate place at the means for altering **500**. The robotic transport unit **110** helps provide the data storage library **100** the ability to alter write protect of a tape cartridge **101** all contained within the data storage library **100**.

Method step **608** is directed to designating the selected tape cartridge from the WMRM pool **104** to a WORM tape cartridge **502** by the means for altering **500**. This is depicted in FIG. **5** via the two-way arrow passing through the WORM function block **500**. In this case, the selected tape cartridge will pass from the left side of the WORM function block **500** to the right side of the WORM function block **500**.

Because, in the present embodiment, the WORM function block **500** is located within the data storage library **100**, the WORM tape cartridge **502** can be reversed back to a WMRM tape cartridge **104** by passing through the WORM function block **500** from the right to the left using the robotic transport unit **110** and other mechanisms and devices without the intervention of human hands. This is featured in method step **610** whereby a request is received, by the client **102** for example, to eliminate the WORM tape cartridge **502** and all the data therein. This may be requested because the client **102** no longer wants the data on the WORM tape cartridge **502**, wants to overwrite data to the WORM tape cartridge **502**, wants to use the WORM tape cartridge **502** for a different purpose, etc. The request of step **610** is executed via the WORM function block **500**, which designates the WORM tape cartridge **502** to a WMRM tape cartridge **104**, as featured in method step **612**. As shown in method block **614**, once the WORM tape cartridge **502** has been converted back to a WMRM tape cartridge **104**, it can be returned to the WMRM tape cartridge pool **104**. Certain embodiments contemplate reserving a on the tape media **208**, such as in the header of the tape media

208, that possesses instructions stored thereon indicating that the tape cartridges a WORM tape cartridge.

FIG. 7 depicts an embodiment whereby a pool of WORM tape cartridges 106 are created consistent with embodiments of the present invention. The simplified illustration depicts a scratch pool tape cartridges 101 which comprise WMRM pools 104 and WORM pools 106. The tape cartridges 101 from the WMRM pool 104 passes through the WORM function block 500 to become WORM tape cartridges forming the WORM pool 106. As described in conjunction with FIGS. 5 and 6, the WORM function block 500 essentially cooperates with tape cartridges 101 to convert between WORM tape cartridges and WMRM tape cartridges consistent with the functional spirit of the WORM station 130. WMRM tape cartridges from the scratch pool 104 can be selected to be converted into a scratch pool of WORM tape cartridges 106 consistent with parameters described in conjunction with FIGS. 5 and 6.

Embodiments of the present invention can be commercially practiced in a Spectra Logic T-Finity tape cartridge library manufactured by Spectra Logic of Boulder Colo., shown in FIG. 8. The T-Finity unit 800 comprises a first and second shelf system 830, 840 that are adapted to support a plurality of the removable storage devices, such as the tape cartridge magazines that contain a plurality of tape cartridges 101. The second shelf system 830 has at least one tape drive (not depicted) adapted to read and write data to and from a tape cartridge. Functionally interposed between the first and second shelf system 830, 840 is a magazine transport space 810. The magazine transport space 810 provides adequate space for a tape cartridge magazine (not depicted) to be moved, via a magazine transport (not depicted), from a position in the shelf system 830, 840 to a tape drive (not depicted). Tape cartridge magazines can be transferred into and out from the T-Finity library via the entry/exit port 850. The T-Finity tape library 800 includes a means for cooling as shown by the fans 860 located at the base. T-Finity unit 800 further comprises a WORM station 130 (not shown) to convert WMRM tape cartridges into WORM tape cartridges and back again.

It is to be understood that even though numerous characteristics and advantages of various embodiments of the present technology have been set forth in the foregoing description, together with the details of the structure and function of various embodiments of the invention, this disclosure is illustrative only, and changes may be made in detail, especially in matters of structure and arrangement of parts within the principles of the present technology to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed. For example, multiple or even predetermined pluralities of scratch pools can be managed for example, while still maintaining substantially the same functionality without departing from the scope and spirit of the claimed invention. Another example can include using these techniques across multiple library partitions, while still maintaining substantially the same functionality without departing from the scope and spirit of the claimed invention. Further, though WORM tape cartridges may be selected from the scratch pool of WMRM tape cartridges based on a parameter, embodiments contemplate selecting a WMRM tape cartridge for conversion to a WORM tape cartridge based on random selection, some order of first chosen last chosen, new tape cartridges, all tape cartridges, downgrade older versions of tape cartridges, etc., for example, without departing from the scope and spirit of the claimed invention. Further, for purposes of illustration, a first and second tape drive 122 and tape cartridges 101 are used herein to simplify the description for a plurality of tape drives 122 and tape cartridges 101. Finally, although the preferred embodiments described herein are directed to tape drive systems, and related technology, it will be appreciated by those skilled in the art that the claimed technology can be applied to other systems, without departing from the spirit and scope of the present technology.

It will be clear that the claimed technology is well adapted to attain the ends and advantages mentioned as well as those inherent therein. While presently preferred embodiments have been described for purposes of this disclosure, numerous changes may be made which readily suggest themselves to those skilled in the art and which are encompassed in the spirit of the claimed technology disclosed and as defined in the appended claims.

It is to be understood that even though numerous characteristics and advantages of various aspects have been set forth in the foregoing description, together with details of the structure and function, this disclosure is illustrative only, and changes may be made in detail, especially in matters of structure and arrangement to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.

What is claimed is:

1. A method comprising:
- providing a tape library containing a robotic transporter, a scratch pool of tape cartridges, at least one tape drive, and a means for altering a tape cartridge, from the scratch pool of tape cartridges, between a write many and read many (WMRM) arrangement and a write once and read many (WORM) arrangement;
- receiving a request to store data in the WORM arrangement on one of the tape cartridges from the scratch pool;
- selecting the tape cartridge from the scratch pool;
- moving the tape cartridge from the scratch pool to the means for altering the tape cartridge via the robotic transporter;
- designating the tape cartridge as a WORM tape cartridge via the means for altering the tape cartridge, the receiving step, the selecting step, and the designating step done entirely within the tape library.

2. The method of claim 1 wherein the tape cartridge is selected from the scratch pool of tape cartridges based on a predefined parameter.

3. The method of claim 2 wherein the predefined parameter is that the tape cartridge has been previously used.

4. The method of claim 2 wherein the predefined parameter is that the tape cartridge has been previously used multiple times.

5. The method of claim 2 wherein the predefined parameter is that the tape cartridge has been previously used more than any other tape cartridge in the scratch pool.

6. The method of claim 1 further comprising removing the designation as a worm tape cartridge and returning the tape cartridge back to the scratch pool of tape cartridges.

7. The method of claim 1 wherein the means for altering the tape cartridge is selected from a group consisting of toggling a mechanical switch comprised by the tape cartridge, storing WORM only instructions on a medium auxiliary memory (MAM) comprised by the tape cartridge, storing WORM only instructions on a header portion of the tape cartridge.

8. A method comprising:
- providing a tape library with a scratch pool of tape cartridges, at least one tape drive, a MAM reader and writer independent of the tape drive;
- receiving a request to store data in a write once and read many (WORM) arrangement on one of the tape cartridges from the scratch pool;

selecting a tape cartridge from the scratch pool;

moving the tape cartridge from the scratch pool to the MAM reader and writer via the robotic transporter;

designating the tape cartridge as a WORM tape cartridge by storing WORM only instructions on a MAM device located in the tape cartridge via the MAM reader and writer.

9. The method of claim **8** wherein the tape cartridge is selected from the scratch pool of tape cartridges based on a predefined parameter.

10. The method of claim **9** wherein the predefined parameter is that the tape cartridge has been previously used.

11. The method of claim **9** wherein the predefined parameter is that the tape cartridge has been previously used multiple times.

12. The method of claim **9** wherein the predefined parameter is that the tape cartridge has been previously used more than any other tape cartridge in the scratch pool.

13. The method of claim **8** further comprising removing the designation as a worm tape cartridge and returning the tape cartridge back to the scratch pool of tape cartridges.

14. The method of claim **8** further comprising toggling at least one bit in the MAM device to designate the tape cartridge as a WORM tape cartridge.

15. A method comprising:

providing a tape library containing a scratch pool of tape cartridges, at least one tape drive, and a means for altering a tape cartridge between a write many and read many arrangement and a write once and read many (WORM) arrangement, the scratch pool of tape cartridges;

receiving a request to store data in the WORM arrangement on one of the tape cartridges from the scratch pool;

selecting the tape cartridge from the scratch pool based on a predefined previous use parameter of the tape cartridge;

moving the tape cartridge from the scratch pool to the means for altering the tape cartridge via the robotic transporter; and

designating the tape cartridge as a WORM tape cartridge via the means for altering the tape cartridge, the receiving step, the selecting step, and the designating step done entirely within the tape library.

16. The method of claim **15** wherein the parameter is that the tape cartridge has been previously used more than two times.

17. The method of claim **15** wherein the predefined parameter is that the tape cartridge has been previously used more than any other tape cartridge in the scratch pool.

18. The method of claim **15** further comprising removing the designation as a worm tape cartridge and returning the tape cartridge back to the scratch pool of tape cartridges.

19. The method of claim **15** wherein the means for altering the tape cartridge is storing WORM only instructions on a MAM comprised by the tape cartridge wherein the tape library contains a MAM reader and writer device therein.

20. The method of claim **15** wherein the means for altering the tape cartridge is selected from a group consisting of toggling a mechanical switch comprised by the tape cartridge, storing WORM only instructions on a MAM comprised by the tape cartridge, storing WORM only instructions on a header portion of the tape cartridge.

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